UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/698,040	10/30/2003	David Hait	5013.005	1172

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Pearl Cohen Zedek Latzer, LLP
1500 Broadway
12th Floor
New York, NY 10036

EXAMINER
SEE, CAROL A

ART UNIT	PAPER NUMBER
3693	

NOTIFICATION DATE	DELIVERY MODE
04/07/2011	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

USPTO@pczlaw.com
Arch-USPTO@pczlaw.com

	Application No.	Applicant(s)
Office Action Summary	10/698,040	HAIT, DAVID
	Examiner	Art Unit	
	Carol See	3693	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
  Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) ☒ Responsive to communication(s) filed on *14 January 2011*.

2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.

3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4) ☒ Claim(s) *10-35* is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5) ☐ Claim(s) _____ is/are allowed.

6) ☒ Claim(s) *10-35* is/are rejected.

7) ☐ Claim(s) _____ is/are objected to.

8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9) ☐ The specification is objected to by the Examiner.

10) ☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☐ All b)☐ Some * c)☐ None of:

      1.☐ Certified copies of the priority documents have been received.

      2.☐ Certified copies of the priority documents have been received in Application No. _____.

      3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
    Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413)
    Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1.   Examiner made several attempts to contact Applicant to discuss proposed claim amendments and possibly addressing them through an Examiner's Amendment. As no response was received to Examiner's requests, the following final office action is submitted for Applicant's review.

2.   Examiner acknowledges Applicant's Arguments/Remarks, submitted 1/14/20110, which have amended claims 10-13, 17-20, 26, 28 and added new claims 29-35.

3.   Examiner further acknowledges the interview summaries presented by Applicant for telephone interviews held 12/15/2010 and 1/12/2011.

4.   Amended claims 11, 12, 13 and 26 overcome previous objections, which are hereby withdrawn.

5.   Amended claims 10, 17 24 and 25 overcome previous rejections under 35 USC 112, which are hereby withdrawn.

6.   Amended claim 17 overcomes previous rejection under 35 USC 101, which is hereby withdrawn.

7.   Claims 10-35 are currently pending in this action.

Response to Arguments

8.   Applicant's arguments filed 1/14/2011 have been fully considered, and are persuasive. The claims are allowable over the prior art of record subject to Applicant addressing the objections and 35 USC 112, 2nd para. Rejections noted below.

Claim Objections

9.   Claims 13, 20, 23,27-32 and 35 are objected to under 37 CFR 1.75(c), as being

of improper dependent form for failing to further limit the subject matter of a previous

claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the

claim(s) in proper dependent form, or rewrite the claim(s) in independent form.

Re claims 13 and 20: the language of claims 13 and 19 recites a machine

configured to compute a value as a function of an index price when the option is

exercised. This language fails to further narrow the scope of claims 12 and 19 (from

which claims 13 and 20 depend, respectively) which recite a machine configured to

compute a value as a function of a security price when the option is exercised.

Re claim 23: Examiner recommends the language be amended to more clearly

reflect method steps, as follows: The method…, further comprising calculating a price

of the option at a node at the same time as the node vega for said node is calculated.

Re claim 27: Examiner recommends inserting the word "further" following

"….Claim 17,…"

Re claims 28 and 35: Examiner suggests inserting the word "binomial" to

describe the tree.

Re claim 29: Fails to further narrow the scope of claim 10 from which it depends,

as claim 10 does not present a concept of computing a value for node vega when an

option is not exercised. It is unclear as to whether the equation in claim 29 is the same as the language in claim 11. Clarification is requested.

Re claim 30: Fails to further narrow the scope of claim 10 from which it depends, as claim 10 does not present a concept of computing a value for node vega when an option is exercised. It is unclear as to whether the equation in claim 30 is the same as the language in claim 12. Clarification is requested.

Re claim 31: Fails to further narrow the scope of claim 17 from which it depends, as claim 17 does not present a concept of computing a value for node vega when an option is not exercised. It is unclear as to whether the equation in claim 31 is the same as the language in claim 18. Clarification is requested.

Re claim 32: Fails to further narrow the scope of claim 17 from which it depends, as claim 17 does not present a concept of computing a value for node vega when an option is exercised. It is unclear as to whether the equation in claim 32 is the same as the language in claim 19. Clarification is requested.

Re claim 35: for clarity, Examiner suggests amending claim to read "…is configured to iteratively calculate…for the binomial trees, using the Newton-Raphson method.

Claim Rejections - 35 USC § 112

10.   The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly
> claiming the subject matter which the applicant regards as his invention.

11.   Claims 10-35 are rejected under 35 U.S.C. 112, second paragraph, as being

indefinite for failing to particularly point out and distinctly claim the subject matter which

applicant regards as the invention.

Re claims 10, 17 and 28: it is unclear as to the meaning of single volatility and

new value of volatility (clm 28). Where does this value come from? And what is the

meaning of using a single volatility for all nodes – is it a single value that is the same for

each node in a tree, or is it one value for each node that is different at each node? Or

does Applicant intend a different meaning? Further, re claim 28, the 3rd clause that

begins "calculate the implied volatility" is unclear in how the binomial trees are

interrelated (also for claim 35).

Re claim 12: the recitation "the security price" lacks sufficient antecedent basis in

the claims.

Re claim 13: the recitation "the index price" lacks sufficient antecedent basis in

the claims.

Re claim 14: it is unclear as to which "node vega" Applicant is referring, as there

are multiple node vegas in a single binomial tree.

Re claims 15 and 22: the recitation "the new values for implied volatility" lacks

sufficient antecedent basis in the claims.

Re claim 21: the meaning of the following is unclear - "calculating node vega iteratively using new values for each iteration...". The discussion of the binomial tree includes a plurality of nodes for which node vega is calculated. To which node is this referring? Also, "using new values" – to what new values is this referring?

Re claims 29: it is unclear as to what the phrase "when the option is not exercised..." is intended to modify. For clarity, Examiner suggests amending the claim language to read "...wherein said computing device is configured to compute a value for node vega at a node when the option is not exercised at a subperiod of time i corresponding to the node, as follows:..."
The claim is further unclear because all terms of the presented equation are not defined in the claim – each divisor, each denominator and each other individual term. Also, regarding the term "p", is a probability of what?

Re claim 30: the arguments are similar to claim 29 regarding definition of terms and ordering of the claim language for clarity.

Re claim 31: For clarity, Examiner suggests amending the claim language to read "...Claim 17, further comprising, when the option is not exercised at a subperiod...node, computing the value for node vega at the node as:..."
The claim is further unclear because all terms of the presented equation are not defined in the claim – each divisor, each denominator and each other individual term. Also, regarding the term "p", is a probability of what?

Re claim 32: For clarity, Examiner suggests amending the claim language to read "...Claim 17, further comprising, when the option is exercised at a subperiod...node, computing the value for node vega at the node as:..."

Re claims 33 and 34: The claims are unclear because all terms of the presented equations are not defined in the claim – each divisor, each denominator and each other individual term. Also, regarding the term "p", is a probability of what?

Claims submitted by Applicant on 1/14/2011 (not including the equations), some of which are addressed by the objections and rejections above, are provided below.

Amended Claim Listing

10. (Currently Amended) A machine comprising:
   a computing device for determining an implied volatility of an American option, wherein said device is configured to:
   generate a binomial tree having a plurality of nodes, each node corresponding to a different sub-period of time during which the American option can be exercised prior to the time when the option expires;
   compute a value for node vega at each node of the binomial tree for the corresponding sub-period of time using a single volatility for all nodes in the binomial tree;
   compute a value for vega for the binomial tree using the values for node vega computed at the nodes; and
   compute a value for the implied volatility of the American option using a function of the value of vega computed for the binomial tree.

11. (Currently Amended) The machine of Claim 10, wherein the computing device is configured to compute the value for node vega at a node as the exact derivative of the option price with respect to the volatility when the option is not exercised at the sub-period of time corresponding to the node.

12. (Currently Amended) The machine of Claim 10, wherein the computing device is configured to compute the value for node vega at a node as a function of the security

price of the option when the option is exercised at a sub-period of time corresponding to the node.

13. (Currently Amended) The machine of Claim 12, wherein the computing device is configured to compute the value for node vega at a node as a function of the index price of the option when the option is exercised at a sub-period of time corresponding to the node.

14. (Previously Presented) The machine of Claim 10, wherein said computing device is configured to calculate the implied volatility of the American option iteratively using new values for node vega in each iteration until the computed price of the American option converges to the market price of the American option.

15. (Previously Presented) The machine of Claim 14, wherein said computing device is configured to calculate the new values for implied volatility in each iteration using the Newton-Raphson method.

16. (Previously Presented) The machine of Claim 10, wherein said computing device is configured to calculate the price 0fthe option at each node at the same time as the computing device calculates node vega at the node.

17. (Currently Amended) A method for determining an implied volatility of an American option, wherein said method comprises:
generating a binomial tree having a plurality of nodes, each node corresponding to a different sub-period of time during which the American option can be exercised prior to. the time when the option expires;
computing a value for node vega at each node of the binomial tree for the corresponding sub-period of time using a single volatility for all nodes in the binomial tree;
computing a value for vega for the binomial tree using the values for node vega computed at the nodes; and
computing a value for the implied volatility of the American option using the value of vega computed for the binomial tree wherein each of the computing steps is performed by a computing device.

18. (Currently Amended) The method of Claim 17, wherein the value for node vega at a node is calculated as the exact derivative of the option price with respect to the volatility when the option is not exercised at the sub-period of time corresponding to the node.

19. (Currently Amended) The method of Claim 17, wherein the value for node vega at a node is calculated as a function of the security price of the option when the option is exercised at a sub-period of time corresponding to the node.

20. (Currently Amended) The method of Claim 19, wherein the value for node vega at a node is calculated as a function of the index price of the option when the option is exercised at a sub-period of time corresponding to the node.

21. (Previously Presented) The method of Claim 17, wherein computing the value of the implied volatility of the American option comprises calculating node vega iteratively using new values for each iteration until the computed price of the American option converges to the market price of the American option.

22. (Previously Presented) The method of Claim 21, wherein calculating the new values for implied volatility in each iteration comprises using the Newton-Raphson method.

23. (Previously Presented) The method of Claim 17, wherein node vega and the price of the option are calculated at the same time for each node.

24. (Previously Presented) The machine of claim 10, wherein said machine is configured to compute a value for vega for the binomial tree recursively using values for node vega computed at the nodes.

25. (Previously Presented) The method of claim t7, wherein said computing of a value for vega for the binomial tree is conducted recursivelv using values for node vega computed at the nodes.

26. (Currently Amended) The machine of Claim 10, wherein said computing device is configured to compute a value for the option price at each node and the node vega for the corresponding sub-period of time using the option price of a node corresponding to a subsequent period of time.

27. (Previously Presented) The method of Claim 17, comprising the step of computing a value for the option price at each node and wherein the value for the node vega for a sub- period of time is computed using the option price of a node corresponding to a subsequent period of time.

28.(Currently Amended) A machine comprising:
a computing device for determining implied volatility of an American option, wherein said device is configured to:
iteratively generate a new tree for each new- value of volatility, the tree having a plurality of nodes, each node corresponding to a different sub-period of time during which the American option can be exercised prior to the time when the option expires; calculate a value of vega for each tree using values of the option price calculated at nodes of a single tree using a single volatility, for all nodes in the single tree; and, calculate the implied volatility of the option using the values calculated for vega for the trees.

29. (New) The machine of Claim 10, wherein, when the option is not exercised at a sub-period of time i corresponding to a node, said computing device is configured to compute a value for node vega at the node as: ...

31. (New) The method of Claim 17, wherein, when the option is not exercised at a sub-period of time i corresponding to a node, the value for node vega at the node is computed as...:

32. (New) The method of Claim 17, wherein, when the option is exercised at a sub-period of time i corresponding to a node, the value for node vega at the node is computed as...

33. (New) The machine of claim 24, wherein said machine is configured to compute a value for vega for the binomial tree using a recursive function of the values for node vega computed at the nodes, ...

35. (New) The machine of Claim 28, wherein said computing device is configured to use the Newton-Raphson method to iteratively calculate the value for the implied volatility of the American option using the values calculated for vega for the trees.

Conclusion

12.   **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time

policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE

MONTHS from the mailing date of this action. In the event a first reply is filed within

TWO MONTHS of the mailing date of this final action and the advisory action is not

mailed until after the end of the THREE-MONTH shortened statutory period, then the

shortened statutory period will expire on the date the advisory action is mailed, and any

extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

the advisory action. In no event, however, will the statutory period for reply expire later

than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Carol See whose telephone number is (571)272-9742. The examiner can normally be reached on Monday - Thursday 6:45 am - 5:15 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, James Kramer, can be reached on (571) 272-6783. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Carol See/
Examiner, Art Unit 3693

/Rajesh Khattar/
Primary Examiner, Art Unit 3693